



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:

ERAN MAKOVER

Serial No.: 10/083,588

Filed: February 27, 2002

For: AN IMPROVED WIRE  
BONDING CAPILLARY

Examiner: Jonathan J. Johnson

§  
§  
§  
§  
§  
§  
§  
§  
§  
§  
§

Group Art Unit: 1725

Attorney  
Docket: 2069/3

Commissioner of Patents and Trademarks  
Washington, DC 20231

COMMUNICATION

Sir:

In an office action mailed on July 16, 2003, the Examiner rejected claims 3 and 4 of the above-identified patent application as being unpatentable over Gilding, US Patent No. 4,049,506 (henceforth, "Gilding") in view of Evans, US Patent No. 4,950,365 (henceforth, "Evans"). The Examiner's rejection is respectfully traversed.

Briefly, Gilding teaches coating the tip **13** of a wire bonding capillary **11** with a thin layer **16** of osmium, ruthenium or their alloys. Evans teaches coating metal tools such as "screwdriver blades, drill bits, saw blades, wrenches, pliers, socket sets, screws, hammer heads, hinges, nut drivers, shears and the like" (column 4 lines 48-50) with a thin layer of a uniform conformal polymeric material such as parylene.

The Examiner proposes that it therefore would have been obvious to coat the tip of a wire bonding capillary with parylene. Applicant respectfully denies this inference. One ordinarily skilled in the art, after careful study of Evans, would have

concluded that a parylene layer on the tip of a wire bonding capillary would be totally useless.

The critical passage of Evans is the one in which Evans explains the mechanism by which parylene protects metal surfaces from corrosion despite the fact that a

...thin parylene coating is quite soft and is easily worn off of any substrate that is subject to wear or moderate physical handling.  
(column 3 lines 41-43)

The critical passage is column 4 lines 15-22:

The outer parylene layer is almost immediately worn off of the surface of the substrate, exposing the hard coated metal surface. However, the conformal quality of the parylene coating is so efficient that the areas of increased permeability associated with the coating defects--which invariably exist in the hard coated layer--are "filled" with the polymeric coating. (emphasis added)

In other words, the parylene that is effective at inhibiting corrosion is the residual parylene that remains in cracks in the metal surface after the rest of the parylene has been worn off.

Now, the object of the present invention is to inhibit the buildup of contaminant deposits on the surface of the tip and bore of a wire bonding capillary.

The nature of these deposits is described in the specification on page 5 lines 27-29:

Part of these depositions is smeared over the surface of the bore of the capillary during the travel of the bonding wire in it. Other part of these contaminants adheres to the surface of the face of the tip of capillary. (emphasis added)

and on page 6 lines 3-4 (as amended):

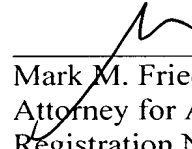
...a solid buffer layer, separating between the hard alumina pressing surface of the face of the capillary tip and the wire. (emphasis added)

Attached please find six SEM photomicrographs of the tip of an alumina wire bonding capillary with and without surface contamination. The three photomicrographs on the right show the tip without surficial contamination, at three

different magnifications. The three photomicrographs on the left are corresponding views of the tip with surficial contamination. It is evident that the contaminants cover extensive areas of the surface of the tip and are not confined to cracks in the surface of the tip.

One ordinarily skilled in the art, being aware of the nature of the deposits on the tip of a used wire bonding capillary, as described above, and being taught by Evans that the effective portion of a parylene layer is the portion that remains in the cracks of a protected surface after the rest of the parylene has been worn off the surface, would have concluded that parylene would be ineffective in preventing contaminant buildup on the surface of the tip of a wire bonding capillary. Therefore, the present invention, as recited in claims 3 and 4, is in fact patentable over the combined teachings of Gilding and Evans.

Respectfully submitted,



---

Mark M. Friedman  
Attorney for Applicant  
Registration No. 33,883

Date: December 14, 2003